

**CLAIMS**

1. A system for removing and sequestering a preselected amount of carbon dioxide (CO<sub>2</sub>) from a gas having an original CO<sub>2</sub> concentration, the system comprising:
- a reaction bed;
  - distribution means for introducing a gas having an original concentration of CO<sub>2</sub> to the bed;
  - a CO<sub>2</sub> solvent supplied to the bed;
  - chemical means disposed within the bed for removing a preselected amount of CO<sub>2</sub> from the gas;
  - means for dissolving the removed, preselected amount of CO<sub>2</sub> into the solvent;
  - and
  - means for disposing of a portion of the solvent which contains the removed, preselected and dissolved CO<sub>2</sub>.
2. A system according to claim 1, wherein the distribution means comprises a plurality of perforated pipes.
3. A system according to claim 1, wherein the solvent is at least one selected from the group consisting of: fresh water, salt water and brackish water.
4. A system according to claim 1, wherein the chemical means comprises limestone.
5. A system according to claim 1, wherein the means for dissolving the CO<sub>2</sub> into the solvent comprises a series of drains integrated into the bed.
6. A system according to claim 1, wherein the means for disposing of the solvent includes transporting the portion of the solvent which contains the removed, preselected and dissolved CO<sub>2</sub> to at least one of: a CO<sub>2</sub> storage facility, a deep ocean location, an underground aquifer and a depleted gas well.

7. A system according to claim 1, wherein the means for disposing of the solvent is driven by gravitational forces.

8. A system according to claim 4, wherein the chemical means comprises limestone.

9. A system according to claim 8, wherein the limestone is granulated.

10. A system according to claim 9, wherein the granulated limestone comprises a plurality of stones of a discrete diameter and wherein the diameter of the stones is determined by a Sauter mean diameter calculation.

11. A system according to claim 1, wherein at least 90% of the original CO<sub>2</sub> concentration of the gas is dissolved in the portion of the solvent that is disposed of.

12. A system according to claim 1, wherein no more than 90% of the original CO<sub>2</sub> concentration of the gas is dissolved in the portion of the solvent that is disposed of.

13. An apparatus having a defined reaction bed for removing and sequestering CO<sub>2</sub> from a gas, the apparatus comprising:

a plurality of inlet channels having a defined length and height;

means for supplying water at a controlled flow rate into at least one inlet channel;

chemical means for removing CO<sub>2</sub> from a gas having an original concentration of CO<sub>2</sub>, the chemical means being in fluidic contact with at least one inlet channel;

distribution means for distributing the gas so that the gas comes into contact with the chemical means;

a plurality of outlet channels having a defined length and height located proximate to the chemical means; and

means for transporting the water from the chemical means into at least one outlet channel, the means for transporting the water being in fluidic contact with the chemical means.

14. An apparatus according to claim 13, wherein the distribution means comprises a plurality of perforated pipes.

15. An apparatus according to claim 13, wherein the means for transporting the water comprises at least one drain grate.

16. An apparatus according to claim 13, wherein the number, length and height of at least one of: the inlet channels and the outlet channels, is determined by the flow rate of the water divided by a superficial velocity of the water.

17. An apparatus according to claim 13, wherein at least 90% of the original CO<sub>2</sub> concentration of the gas is dissolved in the water transported to the outlet channels.

18. An apparatus according to claim 13, wherein no more than 90% of the original CO<sub>2</sub> concentration of the gas is dissolved in the water transported to the outlet channels.

19. An apparatus according to claim 13, wherein the water is supplied from at least one selected from the group consisting of: a fresh water source, a salt water source and a brackish water source.

20. An apparatus according to claim 13, wherein the means for transporting the water is driven by gravitational forces.